Water Supply Availability Analysis for the Coyote Valley Specific Plan

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Coyote Valley Specific Plan Water Supply Availability Analysis

The City of San Jose is currently preparing for the development of the Coyote Valley, and has asked the District to provide information on the water supply available to serve the development that will result through the Coyote Valley Specific Plan (CVSP).

Under SB 610, preparing the Water Supply Assessment for new development is the responsibility of the appropriate water retail agency. However, if the CEQA lead agency is unable to identify the retail water supplier for the project, then the lead agency is responsible for preparing the SB 610 Assessment. Given the District's role as the water wholesaler and groundwater manager in this area, the City as lead agency has requested that the District, in a consultation role, provide information relevant to the water supply for the proposed CVSP. This information will aid the City in its preparation of the SB 610 Water Supply Assessment.

This document was prepared in response to that request, and includes: a discussion of the existing conditions in Coyote Valley, the projected water supply based on current operations and facilities, and the estimated water demand after the CVSP is in place. Possible alternatives for supplementing the water supply in Coyote Valley are also discussed. The information in this analysis is consistent with the District's 2001 Urban Water Management Plan (UWMP) and the 2003 Integrated Water Resources Planning Study (IWRP), both of which considered the water demand from the proposed CVSP. How the alternatives fit into these existing District Plans is also discussed.

In May of 2004, the District provided guiding principles to help the City of San Jose and its consultants in identifying, developing, ranking, and implementing alternatives for the CVSP. By following those guiding principles, the City can help ensure the District's success in meeting the long-term needs of those who live and work in Santa Clara County, including the Coyote Valley.

The following analysis relies on information currently available from the City of San Jose and its CVSP core consultant team as well as the District's UWMP, IWRP, and other District sources. As more information is developed or our understanding changes through the land use planning and CEQA processes, some of the following analysis may need to be updated.

Coyote Valley and the District's Urban Water Management Plan

During the preparation of the District's 2001 UWMP, City of San Jose staff informed the District of the long-term vision for the Coyote Valley. Based on this information, the UWMP did include the vision's projection of 25,000 households and 50,000 jobs for the Coyote area.

As stated in the UWMP, the District's Board of Directors has adopted Ends Policies as direction to the CEO and staff as to the intended results of District actions. These Ends Policies, and how they can be used to guide the CVSP, were provided to the City in a document entitled "The Santa Clara Valley Water District's Guiding Principles for the City of San Jose's Coyote Valley Specific Plan" in May 2004 and are attached for reference. Following the guiding principles will help ensure the District's success in meeting the long-term needs of those who live and work in Santa Clara County, in accordance with the District's adopted Plans such as the UWMP.

In recognition of the high variability in hydrology and the importance of a reliable water supply in all years, not just on average, The UWMP and the IWRP evaluate the water supply outlook under different hydrologic conditions. Although the water supply information in this WSAA has

been updated from that found in the 2001 UWMP to reflect the District's increased understanding of the Coyote Subbasin, the same approach for characterizing water supply is used. As described later in this document, the water supply projections are very similar and the differences do not substantially change the water supply reliability estimates for the Coyote Valley.

Water conservation was identified as an important component of meeting future water needs in both the IWRP and the UWMP. Recycled water is also one of the key components of the District's water supply mix. As stated in the UWMP, the District target is that water recycling will account for 10 percent of the total water supply in Santa Clara County by the year 2020. Promoting water use efficiency measures such as water conservation and water recycling in major new developments like the CVSP is consistent with the District's water supply planning as adopted in the UWMP and the IWRP.

Background

The mission of the District is a healthy, safe, and enhanced quality of living in Santa Clara County through watershed stewardship and comprehensive management of water resources in a practical, cost-effective and environmentally sensitive manner. As the County's water wholesaler, the District helps ensure there is enough water for the area's needs now and in the future, while maintaining flood protection and protecting the environment.

Since the 1850s, groundwater has been an important component of water supply in Santa Clara County. Historical overpumping of the groundwater subbasin and significant land subsidence in the northern portion of the county led to the formation of the District as the county's groundwater management agency in 1929. Growing populations increased demands on the groundwater subbasin. Land subsidence continued and led to the construction of ten local storage reservoirs, with a combined capacity of 169,000 acre-feet, the importation of surface water, and the construction of three water treatment plants. Today, the District conjunctively manages groundwater and surface water to provide a reliable water supply for the county's 1.7 million residents and its businesses.

The District operates and maintains a countywide conservation and distribution system to convey untreated surface water to groundwater recharge facilities and treatment plants, and to convey treated water to retailers. This water conservation and distribution system includes local reservoirs designed to capture and store runoff, three water treatment plants, District in-stream and off-stream groundwater recharge facilities, and the groundwater subbasins.

Santa Clara County Groundwater Subbasins

Santa Clara County contains three interconnected groundwater subbasins that transmit, filter, and store vast quantities of water. These subbasins are shown in Figure 1.

The Santa Clara Valley Subbasin in the northern part of the county extends from Coyote Narrows at Metcalf Road to the county's northern boundary. The subbasin is bound on the east by the Diablo Range and on the west by the Santa Cruz mountains; these two ranges nearly converge at the Coyote Narrows. The Coyote Subbasin extends from Metcalf Road south to Cochrane Road, where it meets the Llagas Subbasin at a prescribed boundary that generally coincides with a groundwater divide. The Llagas Subbasin extends from Cochrane Road, in Morgan Hill, to the county's southern boundary. The subbasin is hydraulically connected to the Bolsa Subbasin of the Hollister Basin and is bounded on the south by a prescribed boundary at the Pajaro River (the Santa Clara - San Benito County line).

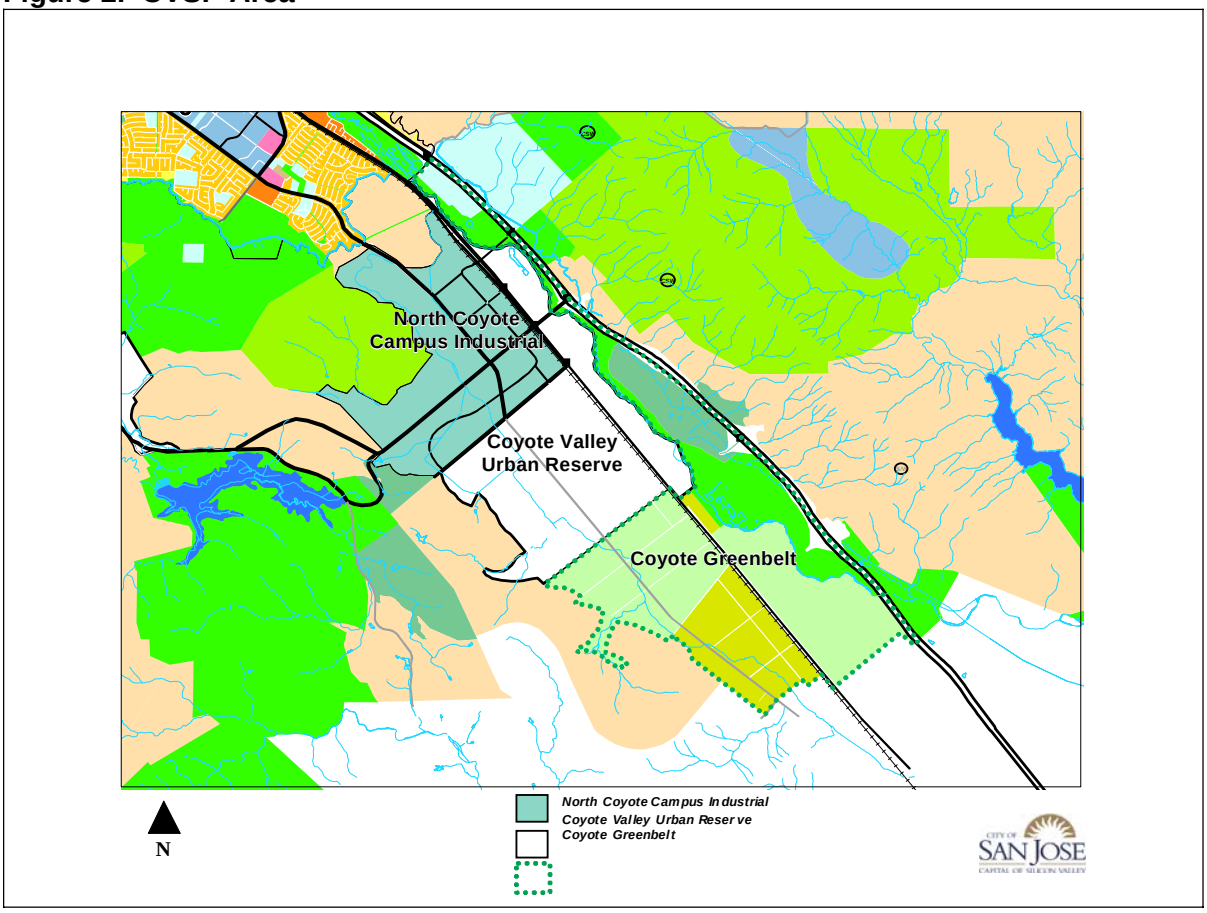
The three subbasins serve multiple functions. They transmit water through the gravelly alluvial fans of streams into the aquifer zones. They filter water, making it suitable for drinking and for municipal, industrial, and agricultural uses. The subbasins collectively also have vast storage capacity, together providing protection against drought and surface water interruptions. Groundwater elevations are affected by natural and artificial recharge and groundwater extraction, and are an indicator of how much groundwater is in storage at a particular time. Both low and high elevations can cause adverse conditions. Low groundwater levels can lead to dry water-production wells and adverse impacts to fisheries and riparian habitats. High groundwater levels can lead to damaged crops, ineffectual septic systems, and nuisance conditions for below-ground structures necessitating dewatering.

Figure 1. Groundwater Subbasins in Santa Clara County

The Coyote Valley Specific Plan

The Coyote Valley Specific Plan (CVSP) being developed by the City of San Jose calls for a mixed used development of more than 25,000 residences and 50,000 jobs within an area that extends from the Coyote Narrows in the north almost to Burnett Avenue in the south. Although this area makes up the majority of the Coyote Subbasin, the subbasin includes some additional area, primarily to the south and to the east. The CVSP is shown in Figure 2.

Figure 2. CVSP Area



Evaluating the future water supply for the CVSP entails looking at the water use and water supply for the Coyote Subbasin as a whole, including not only the greenbelt area but also a portion of the City of Morgan Hill that is also served by groundwater from the Coyote Subbasin. This is necessary since all users within the subbasin impact each other, relying on a shared source of supply.

Historical and Existing Conditions in the Coyote Valley Area

The Coyote Subbasin is approximately 7 miles long and 2 miles wide and has a surface area of approximately 15 square miles. The Coyote Subbasin is generally unconfined and has no significant, laterally extensive clay layers. The Coyote Subbasin is hydraulically interconnected with the Santa Clara Valley Subbasin to the north, and groundwater generally flows north from the Coyote Subbasin into the Santa Clara Valley Subbasin.

Coyote Creek flows north along most of the length of the subbasin near its eastern extent, downstream of and benefiting from controlled releases from Anderson and Coyote Reservoirs. Fisher Creek is an unregulated stream on the west that also flows north, receiving drainage from a significant portion of the Coyote valley floor before converging with Coyote Creek near the Narrows. In its downstream reaches, Fisher Creek gains flow from the subbasin during high groundwater conditions. Both creeks support important habitat corridors, including steelhead and salmon fisheries within Coyote Creek.

The water needs of this area are currently served by the Coyote Subbasin primarily. The subbasin is replenished both by natural recharge and by artificial recharge from controlled

releases to Coyote Creek. The District's Cross Valley pipeline traverses the area, carrying water from the Central Valley Project's San Felipe Division as well as, potentially, water from Anderson Reservoir to the District's water treatment plants and recharge facilities in the northern portions of the County. Recycled water is scheduled to be delivered to the Metcalf Energy Center in the northern area of the Coyote valley from the City of San Jose's South Bay Water Recycling Program. This projected demand of about 2850 acre-feet per year will continue to be served by recycled water in the future as well.

Historically, low lying areas in the north and western portions of the valley have experienced drainage difficulties, including high groundwater conditions. The operational storage of the Coyote Subbasin is estimated to be quite small, only about 25,000 acre-feet. Maintaining groundwater supplies while avoiding nuisance high-groundwater conditions is a challenge made even more difficult by the important fishery and habitat needs supported by Coyote Creek.

As an unconfined aquifer with little separation between the land surface and groundwater surface, the subbasin is also very sensitive to potential groundwater contamination. The valley is largely rural currently, although nitrates from septic systems and agricultural runoff are found in some areas. As the area urbanizes, additional potential sources of contamination (such as urban runoff, gas stations, dry cleaners, and leaking sewer lines) may present new challenges.

Existing Groundwater Elevations

General groundwater elevations in the Coyote Subbasin are represented by three index wells shown in Figure 3. Throughout 2003, groundwater elevations were at least 34 feet above minimum recorded levels and at least 13 feet below the maximum levels recorded in 1983.

General groundwater elevation conditions for the Coyote Subbasin are shown on composite contour maps showing lines of equal groundwater elevation for spring and fall 2003 (Figures 4 and 5). Data from 49 wells were used to construct these contour maps. These maps show a fairly significant decline in groundwater elevations between the spring and fall. This decline is an annual phenomenon that corresponds to the agricultural irrigation season and increased summer water use. Groundwater elevations increase in the winter, when most groundwater extraction for irrigation stops and the rainy season begins.

Figure 3. Hydrograph for Coyote Subbasin Index Wells

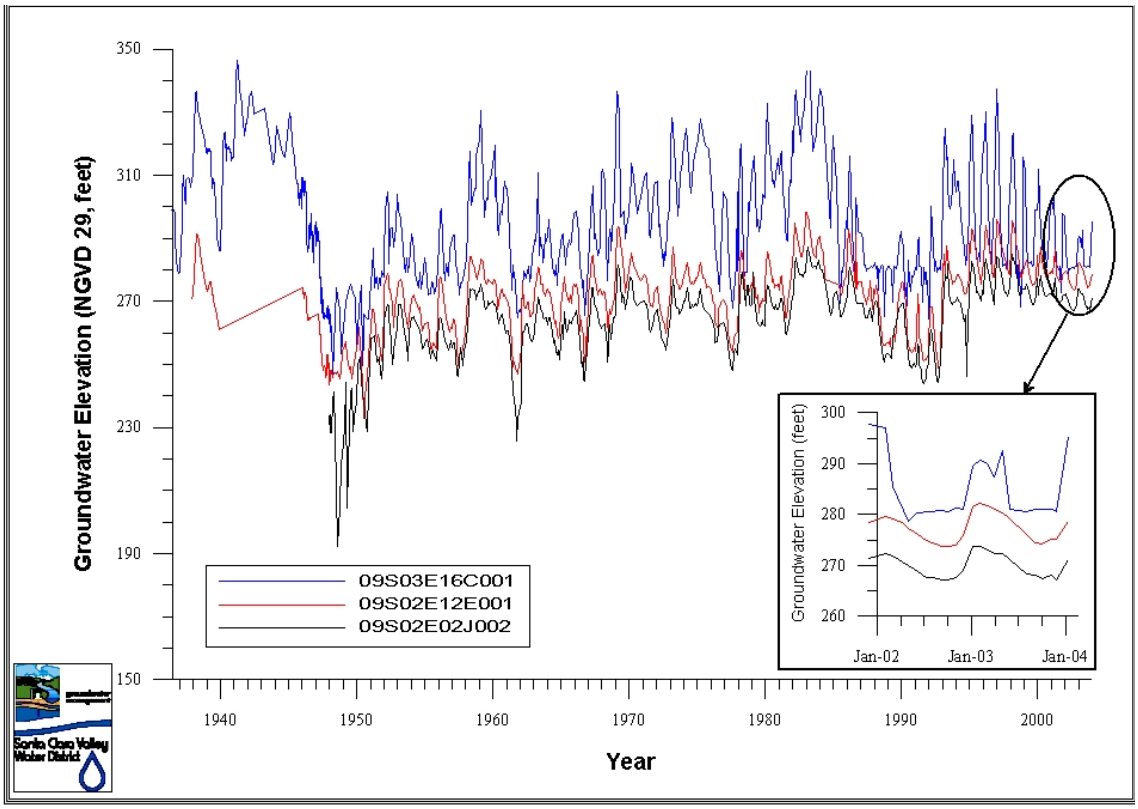


Figure 4. Groundwater Elevation Contours Spring 2003

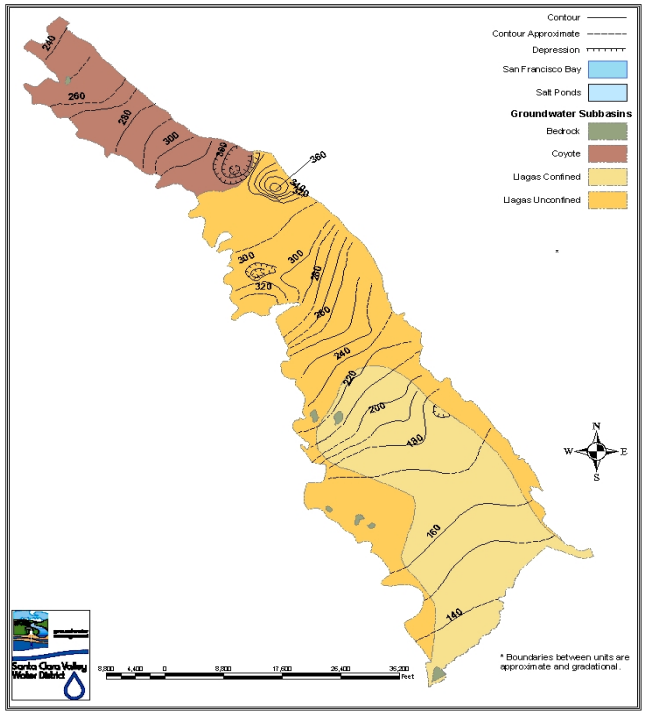
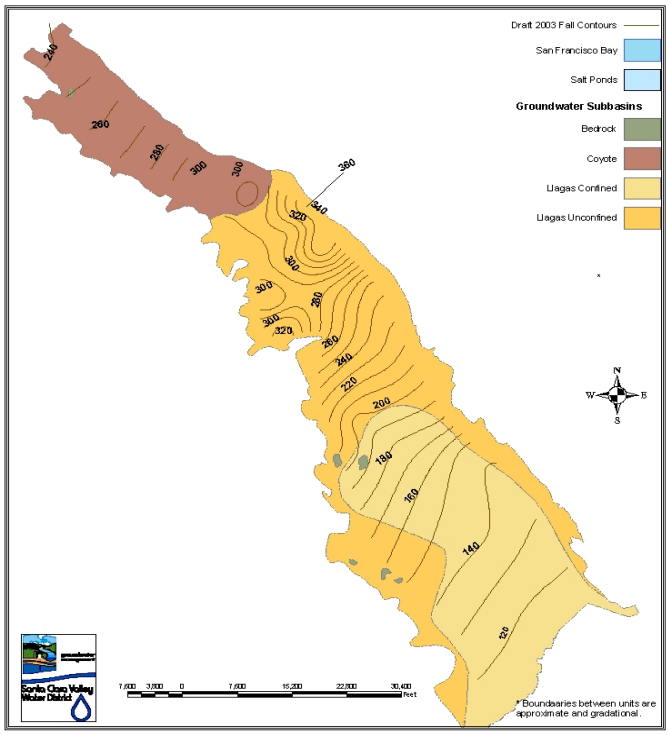


Figure 5. Groundwater Elevation Contours Fall 2003



Existing Groundwater Quality

Existing groundwater quality in the Coyote Subbasin is quite good, although there are wells with nitrates above the Drinking Water Standard. Figure 6 summarizes typical groundwater concentrations within the Coyote Subbasin.

Figure 6. Typical Concentration Ranges for Common Inorganic Constituents[a]

Constituent	Coyote Subbasin Principal Aquifer Zone[b]	Drinking Water Standard[c]	Agricultural Objective[d]
Aluminum (ug/L)	<50	1,000	5,000
Arsenic (ug/L)	<2	50	200
Barium (ug/L)	<100 - 126	1,000	-
Beryllium (ug/L)	<1	4	500
Boron (ug/L)	<100 - 132	-	200
Bromide (ug/L)	<Detection Limit or ND	-	-
Cadmium (ug/L)	<1	5	50
Calcium (mg/L)	37 – 69	-	-
Chloride (mg/L)	17 – 40	600	355
Chromium, Total (ug/L)	<1 – 2	50	1,000
Copper (ug/L)	<50	1,000	500
Fluoride (mg/L)	<0.100	1.7	2
Hardness (mg/L as $CaCO_3$)	180 – 294	-	-
Iron (ug/L)	<100 – 700	300	20,000
Lead (ug/L)	<5	15[e]	100
Magnesium (mg/L)	22 – 43	-	-
Manganese (ug/L)	<20	50	10,000
Mercury (ug/L)	<1	2	-
Nickel (ug/L)	<10	100	2,000
Nitrate (mg/L as NO_3)	6 – 48	45	135[e]
Selenium (ug/L)	<2 - <5	50	20
Silver (ug/L)	<1 - <10	100	-
Sodium (mg/L)	17 – 33	-	-
Specific Conductance (uS/cm)	516 – 625	2,200	3,000
Sulfate (mg/L)	30 – 60	600	-
Total Dissolved Solids (mg/L)	270 – 430	1,500	10,000
Zinc (ug/L)	<50	5,000	10,000

[a] Typical concentration ranges at the approximate 95% Confidence Interval estimate of the true population median.
[b] Principal Aquifer Zone: Aquifer zone from which most water supply wells pump.
[c] Drinking Water Standard: Maximum Contaminant Level (MCL) specified in Title 22 of the California Code of Regulations.
[d] Agricultural Objective: Agricultural water quality objective in the 1995 Water Quality Control Plan for the San Francisco Bay Basin, Regional Water Quality Control Board.
[e] Action level. California has not established a MCL for lead. However, there is a 15 ug/L action level for lead. The action level is exceeded if the concentration of lead in more than 10 percent of tap water samples is greater than 15 ug/L.
Nitrate Agricultural Objective: The value listed in the Basin Plan is 30 mg/L NO3+NO2 (as N), which is approximately equivalent to 135 mg/L nitrate.

Existing and Historical Water Use

The District has groundwater pumping data for the Coyote Valley dating back to July of 1987, as summarized below in Figure 7. The water uses currently in the subbasin include agricultural, domestic, and municipal and industrial. Some of the City of Morgan Hill water supply is also met by groundwater pumping from the Coyote Subbasin.

Figure 7. Historical Groundwater Pumping in acre-feet

Year	Pumping, in acre-feet
1987 (half-year)	3,709
1988	7,003
1989	6,012
1990	6,609
1991	6,434
1992	6,153
1993	6,106
1994	6,467
1995	6,693
1996	6,588
1997	8,004
1998	6,915
1999	7,784
2000	7,232
2001	6,947
2002	6,740
average	6,799

Existing Water Supply

The existing water supply is comprised primarily of groundwater, sustained by both natural and artificial recharge. Local water captured by the Anderson/Coyote reservoir system and imported water from the Central Valley Project both provide source water for recharge in Coyote Creek. It is estimated that the groundwater subbasin would remain in balance with an average annual pumping of about 8,000 acre-feet, given current District operations on Coyote Creek. The groundwater subbasin supply is discussed in more detail below.

Total Projected Demand and Water Supply for the Coyote Subbasin

Projected Water Demand

The water demand projections for the CVSP summarized below are described in more detail in the Water Demand Technical Memorandum prepared by HMH Engineers and dated June 30, 2004. These demand projections reflect the conceptual plan for the CVSP as of that time – as the land use plan is developed, the water demand projections for the CVSP will need to be updated. The demand projections described below and used in determining the sufficiency of the water supply are for project build-out; a timeline for the development of the CVSP has not been identified. It is anticipated that these demands will take decades to develop.

Greenbelt and Others

The current policies for the City of San Jose and for the County are for the areas in Coyote valley designated “greenbelt” to stay in their existing state. In estimating projected demand, it is

assumed that the greenbelt and other areas outside the CVSP planning area within the Coyote Subbasin will remain similar to existing land uses, with water demand similar to the existing water use. The existing water use for these areas is about 4,000 acre-feet annually. As more information is developed about any proposed changes to the greenbelt, this assumption of constancy will need to be revisited.

Residential

Demand projections for the CVSP proposed development was derived separately for the residential, employment, and community areas of the Plan. Water demand to serve the 25,000 new residential units was estimated using an average use of 300 gallons per unit per day. This usage rate is less than the single family residential household use reported in the City of San Jose Baseline Water Use Study and other sources of local water use. However, given the mix of multi-family and single-family housing units planned and the smaller lot sizes than typically found in San Jose currently, this figure seems reasonable for planning purposes. This results in a residential demand projection of about 8,400 acre-feet annually.

Employment

Water demand for the employment sectors was based on the assumption that the jobs will be predominately office jobs, with a typical usage of about 70 gallons per employee per day. Based on projected employment of 50,000 persons, this results in a projected demand of about 4,000 acre-feet annually. The 50,000 jobs is as per the City's Vision of 50,000 "industry driving" jobs, and does not include the support jobs that would arise (such as retail jobs).

Community Uses

Insufficient information is available at this time to estimate the water use for other features, such as the parkways, public areas, and support-sector employment not considered as part of the 50,000 jobs (such as local retail).

Demand Range

The demand range was developed using the minimum household and jobs totals targeted in the CVSP vision. Given that these demand projections have been developed in advance of the land use plan and Specific Plan EIR and thus more precise projections are not possible at this time, a demand range of 16,000 to 20,000 of acre-feet annual demand was agreed upon by the District and the CVSP consultants for use in water supply analysis estimates at this point. As more detail is known about the CVSP, the demand projections will be refined and the demand range will most likely narrow.

Projected Water Supply

Current water use in Coyote Valley is supplied from the groundwater subbasin. The source of this supply is from both natural recharge and artificial recharge (recharge through Coyote Creek resulting from managed releases from Anderson Reservoir). The natural recharge that occurs throughout the valley from rainfall percolation is typically less than the evapotranspiration losses in the valley. Coyote and Fisher Creeks both generally lose water to the groundwater subbasin, although Fisher Creek is a gaining stream in its lower reaches when the groundwater elevation is high. The Coyote Subbasin also feeds water to the north through the Coyote Narrows, a natural flow condition that should be maintained.

The water supply to the Coyote Valley is largely dependent on Coyote Creek, which is predominantly controlled by the operation of Anderson and Coyote Reservoir System upstream. The District is the primary water rights holder for surface waters in the Coyote Creek system, and the Creek is considered to be fully appropriated. This analysis assumes similar operations of the reservoirs in the future, in accordance with provisions of the District's water rights and objectives for flood protection, environmental stewardship, and water supply management. If fishery or other environmental considerations result in a change from current operations, those changes could impact the water supply available within the CVSP.

The historical water balance for the Coyote Subbasin is tabulated below in Figure 8. Areal recharge occurs throughout the subbasin through mechanisms such as rainfall and agricultural return flows. Net river recharge reflects the amount of water recharged into the subbasin via Fisher and Coyote Creeks, primarily through artificial recharge of water resulting from District operations on Coyote Creek. Evapotranspiration, or ET, are losses to the subbasin due to evaporation or uptake from plants of water in the soil. The groundwater outflow term in the table reflects the naturally occurring flow of groundwater from the Coyote Subbasin to the hydraulically-connected Santa Clara Valley Subbasin to the north. (Maintaining this flow avoids adverse impacts to the water supply in the Santa Clara Valley Subbasin.) The total supply reflects these inflows and outflows, summarizing the total supply within the groundwater subbasin under historical conditions (both rainfall and District operations).

Figure 8. Water Supply for the Coyote Subbasin assuming Historical Hydrology

CY	Areal Recharge	Net River Recharge	Net ET	GW Outflow	Total Supply
1988	1933	5251	-56	-4888	2239
1989	1605	7604	-30	-5889	3290
1990	2042	8953	-14	-6227	4754
1991	2942	6760	-6	-5851	3845
1992	3624	8901	-6	-5806	6714
1993	3298	10762	-12	-4527	9520
1994	1916	8430	-24	-2922	7399
1995	4095	9081	-50	-3069	10058
1996	3612	11597	-78	-3460	11671
1997	2707	12413	-115	-3685	11320
1998	3586	9897	-127	-3786	9570
1999	1905	7493	-78	-3981	5340
2000	2055	11584	-87	-4497	9055
2001	2700	8623	-88	-4279	6955
2002	2289	8228	-77	-4100	6339

The average annual water supply over this 15 year period is 7,205 acre-feet. However, the table also shows some of the natural variability that occurs with water supply in the Coyote Subbasin – the supply ranges from a minimum of 2,239 acre-feet in 1988 to a high of 11,671 acre-feet in 1996. This supply has been sufficient to meet historical pumping (shown in Figure 7) due to the usable groundwater storage of the Coyote Subbasin.

It is estimated that in a repeat of 1988 conditions, the driest hydrologic year of record in Coyote Valley, the available water supply would only be 2,239 acre-feet. What demand could be met under this supply scenario depends on the groundwater storage at the beginning of the drought and how much of that groundwater storage can be withdrawn without adverse impacts.

These water supply estimates reflect greater understanding of the Coyote Subbasin as a result of additional data and groundwater modeling analysis. However, the underlying variability and

reliability of the water resource is not substantially different than that described in the UWMP, as tabulated in Figure 9. Figure 9 values are somewhat lower than those shown in Figure 8 since they do not show the supply that available through District artificial recharge activities that occur in Coyote Creek.

Figure 9. UWMP Natural Coyote Subbasin Supply (in acre-feet per year)

	Coyote Subbasin Groundwater Supply
Wet Year	10,000
Long Term Average	4,900
Single Dry Year	0
Critical Dry Period (Multiple Year Drought)	3,200

In its long-term water supply planning, the District looks at historical hydrology. In the UWMP and the 1997 Integrated Water Resources Plan, the Critical Dry Period was used, which was a statistical extension of the 1987-1992 drought into a 10-year 1% probability event. The 2003 IWRP and current interpretation of Board Ends Policies for water supply reliability use repeats of historical hydrology rather than the more severe Critical Dry Period.

The District's current target in its long-term water supply planning includes being able to meet demands in a repeat of the 1987-1992 drought, if it should occur, without drought-response water rationing. (This is not a "worst-case" scenario in that droughts of this magnitude have occurred twice in the 82-year hydrologic record typically used to assess California's water supply.) Unfortunately, District records for Coyote Valley begin in July 1987, so only 5 years of this 6-year drought are captured in this analysis. The average supply during this 5-year period in the Coyote Subbasin is calculated to be 4,168 acre-feet annually. (If 1987 were included, the average would be expected to be slightly lower). As with the single dry year, what demand can be met during a multi-year drought depends on the groundwater storage at the beginning of the drought and how much of that groundwater storage can be withdrawn without adverse impacts. On average, the groundwater pumping that can be met within the subbasin is limited to approximately 8,000 acre-feet a year with existing supplies.

Operational Groundwater Storage Capacity

The District's current estimate of the operational storage capacity of the Coyote Subbasin is 25,000 acre-feet. This value was computed using a static analysis and assumes that the subbasin can be operated such that this maximum value can be extracted -- it is as if the groundwater subbasin is a homogeneous body and that you could optimize groundwater subbasin performance by having all the pumping occur in the right places. In reality, changes in artificial recharge, changes in pumping patterns and locations, and changes in demand scenarios change the operational storage that can be achieved.

This estimate of Coyote Subbasin operational storage is consistent with that used in the IWRP analyses, but is a change from that used in the UWMP. The UWMP and the 1997 IWRP assumed no year-to-year operational storage volume for this subbasin.

This water supply analysis is based on a water balance approach using historical pumping. The development of the CVSP will change the supply in ways that cannot be fully quantified until the source of supply for the CVSP is determined. For example, although we can expect to see some additional recharge from Coyote and Fisher Creek with greater pumping and drawdown of the groundwater subbasin, this increase is small and its value is offset by a loss of groundwater storage reserve. Operationally, consistent drawdown of the groundwater subbasin will result in dry wells in some areas of the subbasin, adverse impacts to the natural flow to the Santa Clara

Valley Subbasin, and decrease in groundwater storage reserves that are crucial for emergency backup and as a drought supply.

Water Supply Augmentation Alternatives

The District uses an integrated water resources planning (IWRP) process to make its long-term investment decisions for water supply management. This process approaches decisions broadly and inclusively, incorporating community involvement and flexibility to respond to changing and uncertain future conditions. Choosing what water resource options to pursue in the future requires balancing multiple, often competing objectives, that reflect the District's overall mission and Board's Ends Policies, including

- Ensuring supply reliability;
- Ensuring supply diversity;
- Ensuring water quality;
- Minimizing cost impacts;
- Maximizing adaptability to changing conditions;
- Protecting the natural environment; and
- Ensuring community benefits including flood protection and recreation.

These objectives are in keeping with District planning, including the 2003 IWRP.

Augmenting the water supply in Coyote can be achieved in a number of ways. How well these differing alternatives meet the District's established policies and previous water supply planning are described below.

Alt 1. Recycled Water for Irrigation and Non-potable Uses

A. using District's existing Silver Creek Pipeline capacity
B. expansion of the SBWR delivery capacity
C. scalping plant in the Coyote Area

The CVSP consultants have estimated that the large landscape area (parks, schools, right-of-ways, and open space) within the CVSP is 730 acres, with an estimated water usage of 4,000 acre-feet per year. In addition, it is estimated that approximately 1,000 acre-feet of demand in the greenbelt area (primarily at the Coyote Creek Golf Club) could also be met with recycled water if it were available. The quantity of recycled water that could be supplied for other non-potable uses besides large landscape irrigation, such as dual plumbing of office buildings and residential yards, has not been quantified at this time.

Given the hydrogeology of the Coyote Subbasin, even when recycled water is intended for irrigation, some of this applied water will work its way to the water table and the principal aquifer. The recently completed Advanced Treated Recycled Water Feasibility Study concluded that the existing tertiary treated recycled water could have impacts on Coyote Valley groundwater quality if used in that area. Using the results of this feasibility study, additional staff analysis that considered all applicable regulations concluded that recycled water used in Coyote Valley that could percolate into the groundwater subbasin be fully advanced treated. Full advance treatment often includes reverse osmosis and ultraviolet light treatment, or similarly effective treatment options. This conclusion was supported by technical review performed by two different external consultants. This is consistent with the District's policy that the groundwater basins are aggressively protected from contamination and the threat of contamination as stated in the UWMP and the IWRP.

Advantages of recycled water use for meeting non-potable water demands are:

- Offsets demand from the groundwater subbasin (which has a limited delivery capacity, as discussed in alternative 4)
- Helps the San Jose/Santa Clara Water Pollution Control Plant remain under the discharge flow cap by providing an alternative to discharge for some of the new wastewater flows generated by the CVSP development. This also creates environmental benefits to the South Bay habitats
- Consistent with state law that promotes recycled water use when appropriate
- Consistent with the CVSP Evaluation Criteria promoting Ecological Sustainability (including the sub-criterion to "Maximize the use of recycled water" among others) and with District policy
- Provides a reliable new water supply consistent with the IWRP, available even in dry years
- Increases the amount of water from local sources in the overall District water supply mix, in keeping with IWRP findings and recommendations
- Consistent with District policies promoting the expansion of water recycling in Santa Clara County and with the recycling targets used in the UWMP

Disadvantages:

- Requires a separate distribution system to provide water to various irrigation sites
- High cost associated with advanced treatment requirements for Coyote Valley
- Potential system capacity expansion costs, depending on how much recycled water is delivered to the CVSP (alternatives 1B and 1C).

The existing South Bay Water Recycling water system was recently expanded with the construction of the Silver Creek Pipeline Extension to deliver water to the Metcalf Energy Center (MEC). The SBWR system could also be used to serve recycled water to non-potable uses within the CVSP area. According to South Bay Water Recycling Program staff, the amount of recycled water available to Coyote Valley (excluding the MEC, which is already accounted for) with the existing recycled water system is limited to the 5 mgd capacity in the Silver Creek pipeline paid for by the District for the District's future use (Alternative 1A). Although it is expected that the SBWR program could supply more recycled water than 5 mgd, the delivery system would have to be expanded for recycled water use to exceed the District's 5 mgd share of the Silver Creek pipeline, adding delivery infrastructure costs (Alternative 1B). This increased capacity could be achieved through development of a parallel pipeline, increasing the recycled water delivery system reliability in addition to expanding the quantity of recycled water available for use in Coyote Valley and elsewhere south of the MEC. Another alternative for expanding the recycled water capacity beyond the District's 5 mgd share of the existing system is through the development of a scalping plant in the Coyote area (Alternative 1C). Diverting some of the wastewater stream from Coyote and treating it there provides another source of recycled water, one not dependent on the existing SBWR delivery system. This alternative would include significant infrastructure costs for the treatment facilities, however.

Serving the non-potable demands including the water needs for the focal point lake is estimated to require more water than the 4,000 acre-feet available per year from the existing recycled water system (when seasonal peaking constraints are taken into consideration). As further information on the potential market for recycled water for non-potable uses is developed through the land use plan, the ultimate capacity of these recycled water alternatives should be revisited.

Alt 2. Surface Water Delivery with a New Water Treatment Plant

Additional surface water delivery to Coyote Valley is one possible alternative water supply. For this supply to be usable to meet the potable water demands for the CVSP, the water would

either need to be treated or percolated into the groundwater subbasin for later extraction. Surface water for recharge is discussed in Alternative 4 below.

A new water treatment plant to serve South County, including Coyote Valley, was evaluated in the District's IWRP. The IWRP 2003 recommended pursuing other alternatives such as water use efficiency and groundwater recharge over a treatment plant.

Advantages:

- Provides an alternate means of delivering potable water besides the groundwater subbasin to the residents and businesses in South County, much as the District's three water treatment plants provide an alternate source of potable water in North County.

Disadvantages:

- Requires ongoing operations and maintenance costs and significant construction costs for new water treatment facilities.
- In and of itself, does not provide an additional water supply source to Santa Clara County and is not consistent with IWRP findings and recommendations.
- Does not provide reliability to Coyote Valley water users. The sources of supply to serve a water treatment plant in Coyote Valley are not as varied as in North County, and the reliability of the source water for the treatment plant is low. If the District's existing Coyote Creek water rights and San Felipe Division contracted water supplies are utilized, insufficient water will be available to meet treatment plant needs during drought and imported water outages (as described further in Alternative 4.)

Alt 3. Diversion of Groundwater from the Santa Clara Subbasin

The CVSP consultants have identified pumping groundwater from the Santa Clara Valley Subbasin for use within Coyote Valley as a water supply alternative. This alternative relies on a new well with a capacity of 5 mgd. This alternative does not provide new water; rather, it reallocates water from the Santa Clara Valley Subbasin to the Coyote Valley.

Advantages:

- Provides access to the larger operational storage capacity and varied sources of supply available to the Santa Clara Valley Subbasin
- Serves much like an system interconnection providing a redundancy in case of emergency outage, even if the facilities are not used as a regular water supply

Disadvantages:

- Requires additional sources of supply to mitigate the impacts on existing users within the Santa Clara Valley Subbasin.
- In analyzing this alternative, this diversion appears to be technically feasible; however, operational analyses show it does reduce the water storage relied upon by the existing users in the northern subbasin for emergency backup supply and drought protection, adversely impacting the water reliability for users of the Santa Clara Valley Subbasin.

The quantity of water exchanged in the analysis of this alternative was 5 mgd, or 5,600 acre-feet per year. Sources of supply to offset the impacts of this exchange on the Santa Clara Valley Subbasin have not been identified, and the costs associated with acquiring this additional source of water and mitigating the impacts to existing water supply users could be significant.

Alt 4. Additional Groundwater Pumping

A. With additional surface water recharge

B. With recharge of fully advanced treated recycled water for indirect potable use

Although a water balance approach like that described above might suggest that a certain quantity of water can meet a given level of demand, that does not mean that operationally facilities exist to support that situation. For example, there is a limit to how much pumping the groundwater subbasin can support. The hydrogeology of the subbasin and the location and timing of pumping and recharge throughout the subbasin impact the total amount of water that can be extracted at any one time. For its water supply planning, the District uses a groundwater model rather than a water balance approach to determine water supply reliability.

Physical Limitations on Additional Groundwater Extraction

The District has performed groundwater model analyses to help identify how much water could be extracted from the subbasin if the CVSP were implemented as per current understanding. For the District analysis, the CVSP demand was assumed to be served via new wells located along Monterey Road, as per conversation with City of San Jose consultants. At the time this analysis was performed, no information was available on the seasonal variability of the projected demand, so the groundwater pumping was assumed to be evenly distributed over the year. Information on the relocation and new cross-section of Fisher Creek was also not available at the time of the analysis, so Fisher Creek was left in its original condition in the modeling. As more information is developed on these and other assumptions through the EIR process, the analysis should be revisited to confirm these preliminary results.

Modeling simulations were performed to determine what amount of the 16,000 to 20,000 acre-foot annual demand could physically be delivered via the groundwater subbasin. (As mentioned above, the groundwater subbasin under current recharge operations can only reliably supply 8,000 acre-feet annually on average). Increasing the CVSP pumping resulted in drying out some areas of the subbasin, particularly in the southwest area. In the simulations, adding additional recharge via percolation ponds in the greenbelt (in the vicinity of the District's existing Cross Valley Pipeline) was able to help alleviate this problem. To test the degree of additional pumping that is physically feasible, as a starting point the groundwater analysis assumed a reliable water supply would be available to feed both Coyote Creek and new recharge facilities. The possible limitations in this future supply is discussed later in this document.

By adding an additional 6,000 acre-feet annually in water supply through new recharge facilities, it was possible to extract 13,000 acre-feet annually from the Coyote Subbasin without adversely impacting existing uses through a repeat of 1988 through 2002 hydrology. Even with additional recharge (beyond the existing Coyote Creek recharge and this supplemental 6,000 acre-feet annual recharge), adverse impacts result from pumping quantities greater than 13,000 acre-feet annually.

This limitation is a very important consideration in identifying possible supplemental water alternatives for the CVSP. Even with additional recharge of 6,000 acre-feet per year, total groundwater pumping within Coyote Subbasin is limited to 13,000 acre-feet. Additional supply for recharge above this amount will not increase the amount that can be pumped.

Possible Sources of Supply for Groundwater Augmentation

- Water Supply via the Cross Valley Pipeline (Alternative 4A). The District's Cross Valley pipeline crosses the Coyote Valley in the south and southwest areas. One possibility is to use this pipeline to convey water to additional recharge facilities to increase the potential groundwater extraction in the Coyote Subbasin. In and of itself, these recharge facilities do not constitute a new supply, but rather a mechanism for getting supplies into the subbasin. In analyzing the District's existing supply sources, two can feed the cross valley pipeline: Anderson Reservoir and San Felipe Division imports from the Central Valley Project.

  Advantages:
  - Maximizes use of the groundwater subbasin as a distribution and storage system

  Disadvantages:
  - Does not provide reliability to Coyote Valley water users.

    The existing supply sources that feed the cross-valley pipeline have dry year limitations. If impacts to existing water users are minimized, no additional water would be available to be recharged from the District's existing sources of supply during dry years, such as 1987-1992 and 1994. Less than 6,000 acre-feet would be available in years like 1995, 1997, and 1997. The necessary 6,000 acre-feet would be available in many wetter-than-average years, however, such as 2000 and 2001. Pumping from the Coyote Subbasin would be limited to a maximum of 8,000 acre-feet during dry years like 1988 through 1994.

    If the CVSP water needs are prioritized over existing uses in the county, there would be an impact on groundwater resources elsewhere. For example, it is projected that the groundwater reserves in North County would drop almost an additional 40,000 acre-feet in a repeat of the 1987-88 drought, compared to what would occur without this additional recharge diversion for the CVSP.

    The hydrologic variability discussed above is not the only challenge to water reliability relying on the Cross Valley Pipeline sources. In addition, the CVP water source is subject to outages when San Luis Reservoir drops below a certain elevation, referred to as "low point". The above discussion is based on a successful resolution of the San Luis low-point problem, possible solutions to which are currently being studied by the U.S. Bureau of Reclamation and the District.

    Current estimates are that the CVP supply will be unavailable during some late summer and fall months in many years (approximately 1 year out of every 2) under future operations, unless a low point solution is implemented. Even if the Coyote recharge diversion is prioritized, no water would be available during low point months. In dry years like 1977, water would only be available in January and February for example.

- Recycled Water for Indirect Potable Use (Alternative 4B). Fully advanced treated recycled water using reverse osmosis and ultraviolet treatment could provide source water for supplementing the groundwater subbasin.

  Advantages:
  - Provides a reliable water supply consistently available regardless of hydrology, low-point, or Delta outages
  - Consistent with CVSP Evaluation Criteria emphasizing ecological sustainability and resource conservation

  Disadvantages:
  - Requires expansion of the recycled water transmission system or creation of a scalping plant in Coyote Valley
  - High costs associated with full advanced treatment facilities
  - Requires additional work to determine if there are institutional or regulatory barriers or pubic perception challenges that preclude the use of advanced-treated recycled water for recharge in Coyote Valley.

Regardless of the source of supply for groundwater recharge, the additional pumping possible from the groundwater subbasin is no more than 5,000 acre-feet annually, to a total of 13,000 acre-feet. With recycled water system expansion or a scalping plant in Coyote, recycled water could provide the 6,000 acre-feet annually of additional recharge needed to meet the 13,000 acre-feet annually pumping rate in all year types.

Alt 5. Treated Water Deliveries from Santa Teresa Water Treatment Plant

The District's existing Santa Teresa Water Treatment Plant is located to the north of Coyote Valley in Almaden Valley. One alternative for supplying water to Coyote Valley would be the expansion of this treatment plant with a new pipeline to serve the CVSP.

Advantages:
- Provides access to the more varied sources of supply available to the Santa Teresa Water Treatment Plant
- Serves much like an system interconnection providing a redundancy in case of emergency outage, even if the facilities are not used as a regular water supply

Disadvantages:
- Requires additional sources of supply to mitigate the impacts on existing users of Santa Teresa Water Treatment Plant and others within the Santa Clara Valley Subbasin.
- Infrastructure costs, including the treated water pipeline connection and possibly expansion of the water treatment plant itself.

Alt 6. Additional Water Use Efficiency Measures in the CVSP

The water demand projections for the CVSP development assume that water use efficiency measures will be utilized to the maximum extent practicable, and therefore water savings from conservation is not quantified as a water supply alternative in this analysis. As stated below, the District in its planning for meeting the water needs of Coyote Valley assumes that water use efficiency will be incorporated, and urges the City to ensure that is the case as the CVSP is planned and ultimately developed. Efficient water use is consistent with District's policies, IWRP, and UWMP.

Water Supply Augmentation Costs

The cost of any of these water supply augmentation alternatives is significant. Additional groundwater pumping will require land acquisition for constructing new recharge ponds in addition to ongoing operations and maintenance. The capacity of the Coyote groundwater subbasin is small compared to the size of the water demand at build-out – ensuring dry year reliability will not be possible utilizing the Coyote Subbasin capacity alone.

Ensuring dry year reliability will require either a water supply source that is not dependent on hydrology (such as recycled water) or expensive dry year water supplies to supplement the existing supplies. Although recycled water can provide a reliable source of supply, its use in Coyote Valley will require additional treatment costs to protect the groundwater resource.

Maximizing water use efficiency and groundwater protection measures as the CVSP is developed will help keep the water supply more affordable in the long-term for the residents and businesses in this new community.

Considerations for the CVSP

To help ensure a clean, safe, reliable and affordable water supply for all water users within the Coyote Valley, the District advises the CVSP team to include the following considerations in the land use planning phase and the CVSP EIR:

Water Use Efficiency

Evaluation criteria for the CVSP development includes ecological sustainability: "CVSP should be designed to minimize waste, efficiently use its natural resources, and to manage and conserve them for use of the present and future generations", including conserving water as a precious resource.

Toward this end, the District encourages the use of water use efficiency measures throughout the CVSP, including residences, businesses, landscaping, and public areas. Water efficiency measures that should be promoted by the City in the CVSP include:

- Dual plumbing for both interior and exterior recycled water use;
- Construction standards that require high-efficiency fixtures (for example, high-efficiency 1.2-gallons-per-flush toilets);
- Construction standards that require high-efficiency devices for outdoor water uses (such as self-adjusting weather-based irrigation controllers);
- The use of fully advanced treated recycled water for irrigation of large landscaped areas;
- The use of fully advanced treated recycled water for all water features, such as fountains as well as the focal-point lake and urban channel;
- Enforcement of the City's Model Water Efficient Landscape Ordinance (as per AB 325 1990);
- Promotion and use of drought tolerant and native plantings in landscaping.

As the project is implemented and this new community is developed, there will be numerous opportunities to include these and other resource-efficient measures. Both the City of San Jose Environmental Services Department and the District have staff that can help evaluate and implement conservation measures to help ensure that Coyote Valley will be the ecologically sustainable green showcase envisioned by the CVSP.

Groundwater Protection

Board Ends Policy 2.1.5. The groundwater basins are aggressively protected from contamination and the threat of contamination.

Regardless of what supplemental water supply alternative is developed to support this development, protecting the groundwater subbasin from contamination and the threat of contamination is a crucial component of maintaining water supply reliability to all users within the Coyote Valley. Land uses within the CVSP have the potential to impact the water supply within the Coyote Subbasin. The ambient water quality for Coyote groundwater is excellent. However, the Coyote Subbasin is unconfined with little separation between the land surface and the groundwater, making the subbasin especially vulnerable to contamination. Given the sensitivity of the subbasin and importance of the groundwater resource to the CVSP, the District recommends taking steps above and beyond those required by state and federal law to protect the groundwater subbasin:

- Avoiding high-risk land uses such as underground chemical storage. If such uses can not be avoided, then these businesses should be required to have groundwater monitoring on site and response plans in place, with monitoring beyond the minimum required by law;
- Establishing wellhead protection zones and siting facilities that pose significant risks to groundwater (such as gas stations and dry cleaners) far away from drinking water wells;
- Implementing institutional or structural best management practices for urban runoff, including treatment of surface runoff from commercial and industrial sites;
- Rigorous Commercial and Industrial pretreatment programs to minimize discharges to sanitary sewers;
- Construct piles and other deep excavations according to standards so there is no cross connection with between the surface and groundwater table.

Keeping Options Open

The District recommends that the land use plan incorporate flexibility for future water augmentation options, such as:

- Additional groundwater recharge. The District recommends that the land use plan reserve land in the greenbelt area with access to the District's Cross-Valley pipeline for future recharge facilities. These facilities can be compatible with other CVSP objectives, such as recreation.
- Large landscaped areas and water features like the focal lake should be designed to use appropriately treated recycled water from the South Bay Water Recycling Program.

In May of 2004, the District provided guiding principles to help the City of San Jose and its consultants in identifying, developing, ranking, and implementing alternatives for the CVSP. That document summarized goals that should be taken into consideration in the development of the land use plan for the CVSP from the perspective of the District's mission to ensure a reliable, high quality water supply, protection from floods, healthy creek ecosystems, and recreational opportunities for those who live and work within Santa Clara County. Following those guiding principles and the recommendations above will help ensure the District's success in meeting the long-term needs of those who live and work in Santa Clara County, including the Coyote Valley.